Sections 13.3 and 13.4 (1419457)

Question 123456789101112131415

1. Question Details SCalcET6 13.3.006. \([1289270]\)
Find the length of the curve.
\[
\mathbf{r}(t) = 12t\mathbf{i} - 8t^2\mathbf{j} + 3t^3\mathbf{k}, 0 \leq t \leq 3
\]
\[L = \phantom{0} \]

2. Question Details SCalcET6 13.3.005. \([1289442]\)
Find the length of the curve.
\[
\mathbf{r}(t) = 7\mathbf{i} + 4t^2\mathbf{j} + 2t^3\mathbf{k}, 0 \leq t \leq 3
\]
\[L = \phantom{0} \]

3. Question Details SCalcET6 13.3.004. \([1288761]\)
Find the length of the curve.
\[
\mathbf{r}(t) = \cos(7t)\mathbf{i} + \sin(7t)\mathbf{j} + 7 \ln \cos(t)\mathbf{k}, 0 \leq t \leq \frac{\pi}{4}
\]
\[L = \phantom{0} \]

4. Question Details SCalcET6 13.3.011MI. \([1387593]\)
Let \(C\) be the curve of intersection of the parabolic cylinder \(x^2 = 2y\), and the surface \(3z = xy\). Find the exact length of \(C\) from the origin to the point \((3, 9/2, 9/2)\).
\[L = \phantom{0} \text{Tutorial} \]

5. Question Details SCalcET6 13.3.013. \([1288216]\)
Reparametrize the curve with respect to arc length measured from the point where \(t = 0\) in the direction of increasing \(t\). (Enter your answer in terms of \(s\).)
\[
\mathbf{r}(t) = 5\mathbf{i} + (8 - 2t)\mathbf{j} + (6 - 3t)\mathbf{k}
\]
\[\mathbf{r}(t(s)) = \phantom{0} \mathbf{i} + \phantom{0} \mathbf{j} + \phantom{0} \mathbf{k} \]

6. Question Details SCalcET6 13.3.017MI. \([1387152]\)
Consider the vector function given below.
\[
\mathbf{r}(t) = (3 \sin t, 7t, 3 \cos t)
\]
Do the following.
(a) Find the unit tangent and unit normal vectors \(\mathbf{T}(t)\) and \(\mathbf{N}(t)\).
\[
\mathbf{T}(t) = < \phantom{0} , \phantom{0} , \phantom{0} >
\]
\[
\mathbf{N}(t) = < \phantom{0} , \phantom{0} , \phantom{0} > \quad \text{Tutorial} \quad (b) \text{Find the curvature.}
\]
\[k(t) = \phantom{0} \text{Tutorial} \]

7. Question Details SCalcET6 13.3.019. \([1288179]\)
Consider the vector function given below.
\[
\mathbf{r}(t) = (5\sqrt{2t}, e^{5t}; e^{-5t})
\]
Do the following.
(a) Find the unit tangent and unit normal vectors \(\mathbf{T}(t)\) and \(\mathbf{N}(t)\).
\[
\mathbf{T}(t) = < \phantom{0} , \phantom{0} , \phantom{0} >
\]
\[
\mathbf{N}(t) = < \phantom{0} , \phantom{0} , \phantom{0} >
\]
(b) Find the curvature.
8. Question Details
SCalcET6 13.3.023.MI. [1386538]
Find the curvature.
\[ \mathbf{r}(t) = 7\mathbf{i} + 3\sin t \mathbf{j} + 3 \cos t \mathbf{k} \]
k(t) = [Tutorial]

9. Question Details
SCalcET6 13.3.032. [828432]
Find an equation of a parabola that has curvature 30 at the origin.
- \[ y = 150x^2 \]
- \[ y = x^2 \]
- \[ y = \frac{x^2}{30} \]
- \[ y = \frac{x^2}{15} \]
- \[ y = 30x^2 \]

10. Question Details
SCalcET6 13.4.010. [1289309]
Consider the following position function.
\[ \mathbf{r}(t) = \langle 5 \cos t, 6t, 5 \sin t \rangle \]
(a) Find the velocity of a particle with the given position function.
\[ \langle \quad, \quad, \quad \rangle \]
(b) Find the acceleration of a particle with the given position function.
\[ \langle \quad, \quad, \quad \rangle \]
(c) Find the speed of a particle with the given position function.

11. Question Details
SCalcET6 13.4.012. [1289715]
Consider the following position function.
\[ \mathbf{r}(t) = t^2\mathbf{i} + 7\ln(|t|) \mathbf{j} + 5t\mathbf{k} \]
(a) Find the velocity of a particle with the given position function.

(b) Find the acceleration of a particle with the given position function.

(c) Find the speed of a particle with the given position function.

12. Question Details
SCalcET6 13.4.014. [1287887]
Consider the following position function.
\[ \mathbf{r}(t) = t \sin t \mathbf{i} + t \cos t \mathbf{j} + t^2 \mathbf{k} \]
13. Find the velocity of a particle with the given position function.

\[ v(t) = \] 

Find the acceleration of a particle with the given position function.

\[ a(t) = \] 

Find the speed of a particle with the given position function.

\[ v(t) = \]

14. Find the velocity and position vectors of a particle that has the given acceleration and the given initial velocity and position.

\[ a(t) = 2i + 2t^2j + 6k, \quad v(0) = 7j - 5k \]

Find the acceleration of a particle with the given position function.

\[ v(t) = \]

Find the speed of a particle with the given position function.

\[ r(t) = \]

15. Find the force required so that a particle of mass \( m \) has the following position function.

\[ r(t) = t^2i + t^2j + t^3k \]

What force is required so that a particle of mass \( m \) has the following position function?

\[ F(t) = \]

A projectile is fired with an initial speed of 520 m/s and angle of elevation 30°. The projectile is fired from a position 180 m above the ground. \( g \approx 9.8 \text{ m/s}^2 \)

(a) Find the range of the projectile. (Round the answer to one decimal place.) 

\[ \boxed{\text{km}} \]

(b) Find the maximum height reached. (Round the answer to one decimal place.) 

\[ \boxed{\text{km}} \]

(c) Find the speed at impact. (Round the answer to the nearest whole number.) 

\[ \boxed{\text{m/s}} \]